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## USDA FOREST SERVICE RESEARCH NOTE

PNW-192

November 1972

## IMPROVED ADAPTER FOR INCREMENT BORER RATCHET ASSEMBLY

by

Francis R. Herman, *Mensurationist*

## ABSTRACT

*A stronger adapter for small-diameter increment borer ratchet assemblies can be fabricated easily. A thicker walled adapter can be machined, or a seamless carbon-steel sleeve can be shrunk around a custom-fitted standard square-holed sleeve. Mechanics' hand cream is recommended for lubricating during increment borer use.*

**Keywords:** *Tree rings, tree diameter measurement.*

Modified ratchet wrenches facilitate taking of cores for studies of tree growth.<sup>1/</sup> A ratchet assembly suggested for small-diameter increment borers uses a square-holed sleeve and a stainless steel wire clip.<sup>2/</sup> Because variation in quality and durability of square-holed sleeves sometimes results

in breakage, modification of the sleeve-adapter is recommended.

Modification can be accomplished in two ways: (1) standard square-holed sleeves can be reinforced or (2) a thicker walled adapter can be machined by use of a square broach. Because a square broach is expensive, a large number of adapters would have to be machined to justify its purchase.

Where few increment borer ratchet assemblies are needed, the

<sup>1/</sup> John W. Duffield. A ratchet wrench for over-size increment borers. *Forest Sci.* 3: 21, illus., 1957.

<sup>2/</sup> Francis R. Herman. A ratchet wrench and cleaning equipment for increment borers. *J. For.* 69: 26-27, illus., 1971.



standard square-holed sleeve regardless of quality can be strengthened to eliminate breakage of adapters. Figure 1 shows a strengthened square-holed sleeve adapter. Figure 2 shows details of an improved sleeve-adapter

with a fitted seamless sleeve around the square-holed sleeve to provide additional strength. Such fitting, of course, would be unnecessary if thicker walled adapters were machined using a square broach.

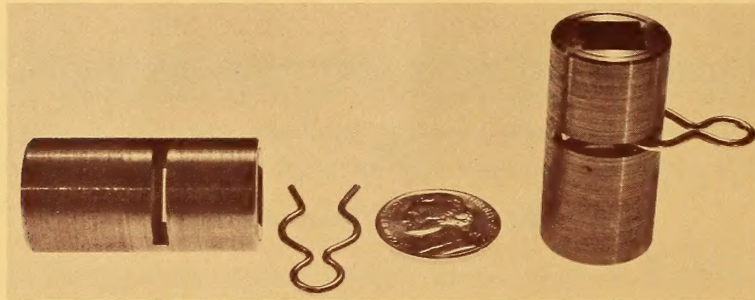


Figure 1.--Improved square-holed sleeve adapter with reinforcing sleeve and custom-fitted stainless-steel clip.

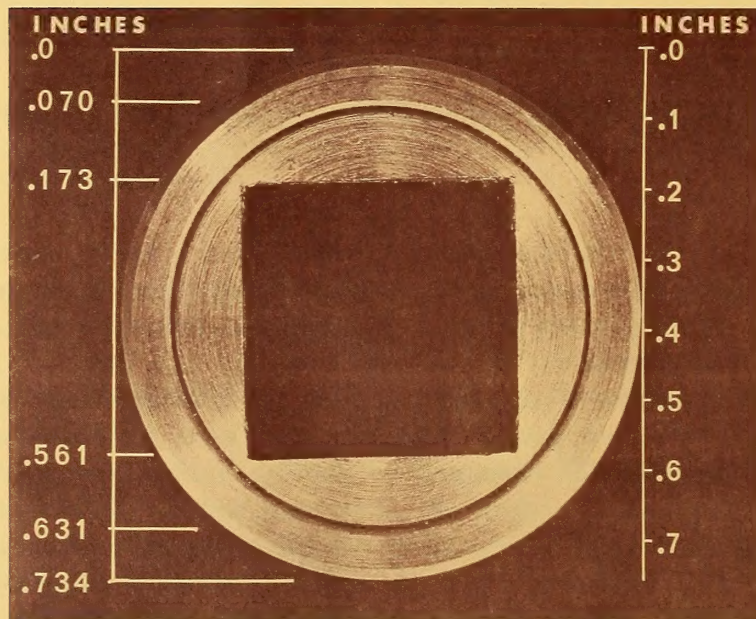


Figure 2.--End view of improved sleeve adapter. Measurements are in thousandths of an inch.



Variations in dimensions through the photographed cross sections of the adapter (fig. 2) are shown only to demonstrate machining tolerance. The thickness of the reinforcing wall around the outside of the standard 3/8-inch square-holed sleeve is optional. However, it should be no thinner than one-sixteenth inch (0.062 inch) according to consulting machinists.<sup>3/</sup>

Length of adapter and positions of slots for stainless steel retaining clip must be determined for each increment borer. Clip should be custom-fitted to eliminate slack along thrust-axis of borer bit.

Figure 3 shows a 0.177-inch diameter, 26-inch-long ratchet-equipped increment borer assembly with improved square-holed sleeve adapter.

In addition to keeping a borer bit cleaned and well-oiled<sup>4/</sup> (also see footnote 2), a borer lubricant can be used to further ease the boring operation and reduce strain on increment borer equipment. Mechanics' hand cream<sup>5/</sup> applied to a borer bit at point of stem entry reduces torque required to both drive bit into and remove it from the stem. Bit may be dipped in a small container of the

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<sup>3/</sup> The square-holed sleeve was modified for the author by the Physics Department of Oregon State University at Corvallis. A seamless carbon-steel sleeve with an inside diameter 1- to 1.5-thousandth inch smaller was shrunk around a standard 3/8-inch-square-holed sleeve. The temper of the square-holed sleeve was undisturbed because only the carbon-steel reinforcing sleeve was heated to facilitate its fitting. By using information in this note and referring to the original article (see footnote 2), any good machinist can fabricate similar adapters.

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<sup>4/</sup> Herschel G. Abbott. A technique for cleaning increment borers. J. For. 55: 909, illus., 1957.

<sup>5/</sup> Credit is given to Harlow B. Scott, USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Forestry Sciences Laboratory, Olympia, Washington, for the suggestion that hand cream facilitates boring operations.

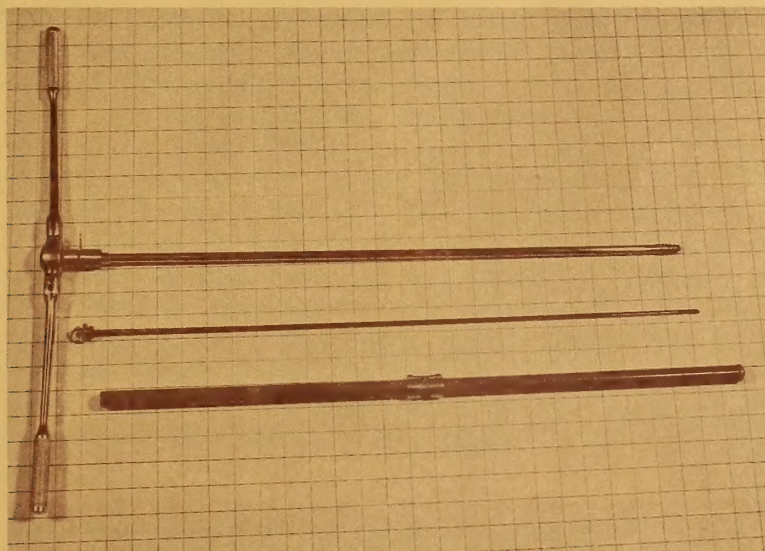


Figure 3.--A 26-inch-long increment borer with improved adapter and ratchet assembly.

hand cream. A portion of cream inside the hollow auger end at the beginning of each boring operation lubricates the core and minimizes troublesome core fracturing.

Select a hand cream that is stable in warm weather and doesn't contain pumice or other abrasive. Those hand creams that liquefy upon exposure to warm air temperatures

are not as desirable for lubrication of borer and core as are those that maintain a creamy consistency. A cleaning cream, if used consistently, also keeps resin and varnish deposits soft so that cleaning is quickly accomplished. Incidentally, such hand creams are efficient for cleaning resin from all kinds of tree measurement equipment with no damage to painted or polished surfaces.

GPO 987-022